



WIRE REINFORCEMENT INSTITUTE®

MEMO

To: Design and Construction professionals

From: Roy H. Reiterman, Technical Consultant, WRI

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Subject: A Sample Specification for Welded Wire Reinforcement (WWR)

We have had many requests for an example of a Sample Specification that design, and construction professionals may review when preparing their own construction documents. The following is a sample specification prepared by an engineer with a WRI member producer. **(Please review the WRI Disclaimer attached hereto.)**

SAMPLE SPECIFICATION ONLY
FOR INFORMATIONAL PURPOSES
NOT INTENDED FOR DUPLICATION OR USE

SECTION XX.XX
WELDED WIRE REINFORCEMENT

X.XX.01 DESCRIPTION: Work under this item shall consist of furnishing and placing reinforcement and any other securing materials, of the type and size designated, as shown on the plans, as directed by the Engineer and in accordance with the contract documents and specifications.

X.XX.02 MATERIALS: The materials for this work shall conform to the requirements of ASTM A185 or A1064 and any further requirements of the local building code. Epoxy-coated wire and welded wire is covered in ASTM specification A884/A 884M. Galvanizing shall conform with ASTM A1060 for either cold-worked wire and hot-dipped galvanizing of welded wire styles (sheets, mats), ASTM A 641/A 641M, for cold-worked wire, or ASTM A123, for hot-dipped galvanizing of welded wire sheets/mats.

X.XX.03 CONSTRUCTION METHODS:

1-Shop Drawings: Prior to fabricating materials, the Contractor shall submit shop drawings of the reinforcement with splice details. Also include material lists, material designations, placement drawings, bending details, and manufacturer's literature for any securing materials. All these items shall be considered for review and approval, in

accordance with ACI, ASTM, and any further specifications of the local building code. Any expenses incidental to the revision or substitution of materials furnished in accordance with the shop drawings and order lists to make them comply with the requirements of the plans, specifications, or special provisions shall be borne by the Contractor.

2-Fabrication:

- a. **Cutting & Bending:** Reinforcement shall be cut and bent to the shapes shown on the plans. Fabrication tolerances shall be in accordance with the requirements of ACI 318. All reinforcement shall be cold bent, unless otherwise permitted by the Engineer. Reinforcement partially embedded in concrete shall not be field bent, except as shown on the plans or permitted by the Engineer.

Coated reinforcement shall not be field cut, unless permitted by the Engineer. Field cutting of coated reinforcement should be performed using hydraulic-powered or friction cutting tools to minimize coating damage and field touch-up. Flame cutting of coated reinforcement will not be permitted. Field cut coated reinforcement shall be repaired immediately with compatible patching material and suitable for repairs in the field.

- b. **Hooks & Bend Dimensions:** Hook dimensions and diameters of bends shall be as shown on the plans. When hook dimensions and diameters of bends are not shown, they shall be in accordance with the ACI 318.
- c. **Identification and Availability:** Reinforcement shall be shipped in bundles, tagged and marked in accordance with the CRSI "Manual of Standard Practice". Welded wire for concrete reinforcement is available with minimum wire sizes of W1.4 (MW9) for plain or smooth (W) welded wire and D4 (MD26) for deformed (D) welded wire. Most producers manufacture wire sizes up to a W20 (MW129) or D20 (MD129) with some capable of producing wire sizes up to W45 (MW290) or D45 (MD290). Check with local manufacturer for availability.

3-Handling, Storage & Surface Condition of Reinforcement: Reinforcement shall be stored above the ground on platforms, skids, or other supports and shall be protected as far as practical from mechanical injury and surface deterioration caused by exposure to conditions producing rust.

Epoxy-coated and galvanized reinforcement shall be handled and stored by methods that will not damage the coating. Bundles shall not be dropped or dragged. Reinforcing steel shall be transported and stored in a manner that will not damage any applied coating. Since the epoxy coating is flammable, the coated reinforcement shall not be exposed to any fire or flame.

Prior to placement of concrete, all reinforcement shall be free from dirt, loose rust or scale, mortar, paint, grease, oil, or other materials that might reduce bond. Reinforcement shall be free from cracks and laminations. Bonded rust, surface irregularities, or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area, and tensile properties of the reinforcement specimen meet the physical requirements for the size and grade of steel specified.

4-Placing & Securing:

- a. **General:** Steel reinforcement shall be accurately placed as shown on the plans and firmly held in positions during the placing and finishing of concrete. Reinforcement shall be lapped and tied around the perimeter of each sheet to maintain the proper positioning of the reinforcement. Lap splices shall have a minimum of two ties per spliced length. For epoxy-coated reinforcing, tie wires and metal clips shall be epoxy, plastic, or nylon coated. For galvanized reinforcing, tie wires and metal clips shall be plastic coated or galvanized. With the exception of tie down bars, welding (tack welding) will not be permitted, unless shown on the plans. Tie down bars shall be placed as shown on the plans. Welding of coated bars will be done with the appropriate protective mask worn, safety equipment used, and suitable ventilation provided. Wire reinforcement shipped in rolls shall be straightened into flat sheets before being placed.
- b. **Support Systems:** Reinforcement shall be supported in its specified and proper position by use of precast blocks, plastic or wire/ bar supports, supplementary bars (tie-down bars), side form spacers or other approved devices. Such devices shall be sufficiently strong and properly placed at frequent intervals to maintain the cover between the reinforcing and the surface of the concrete. The reinforcement cover shall be as shown on the plans. Platforms for the support of workers and equipment during concrete placement shall be supported directly by the forms and not alter the proper positioning of the reinforcing steel.
- c. **Precast Blocks:** Precast support blocks shall have a compressive strength not less than that of the concrete in which they are to be embedded. The face of the blocks in contact with forms for cast-in-place exposed surfaces shall not exceed 2"x2" in size and shall have a color and texture to match the concrete surface. Precast support blocks shall not be used on exposed finished surfaces of precast concrete members. When used on vertical or sloping surfaces, such blocks shall have an embedded wire for securing the block to the reinforcement. For epoxy-coated reinforcing, tie wires shall be epoxy, plastic, or nylon coated. For galvanized reinforcing, tie wires shall be plastic coated or galvanized.
- d. **Wire Supports:** Plastic or wire bar supports, such as chairs and bolsters, shall conform to industry practice as described in the WRI "WWR-500, Manual of Standard Practice" or "TF 702 – Supporting WWR". All metal bolsters or chairs which bear against the forms for exposed surfaces shall be equipped with snug fitting, high density, polyethylene tips which provide 1/2" minimum clearance between the metal and any exposed surface. For epoxy-coated reinforcement, all wire/ bar supports, and bar clips shall be epoxy or plastic coated. For galvanized reinforcing, chair and bar supports shall be hot-dipped galvanized, after fabrication, in accordance with ASTM A1060 or ASTM A123. The spacing of slab bolster rows and high chair rows for deck slabs shall be as noted in WRI's "Manual of Standard Practice, WWR-500" and "TF 702, Supporting WWR" unless otherwise directed by the engineer.

e. **Repair of Coated Reinforcement:**

Epoxy-coated Reinforcement – In addition to the requirements of ASTM D3963, all visible damage (i.e., scratches, nicks, cracks) to the epoxy coating of the reinforcement, caused during shipment, storage or placement shall be repaired by the Contractor at the job site with approved patching material. Ends of reinforcement that have been sheared sawed or cut by other means shall be coated with approved patching material. The areas on the sheets/mats and tie down bars damaged by welding shall be repaired with approved patching material. Patching of damaged areas shall be performed in accordance with the patching material manufacturer's recommendations. Any damaged surface area (prior to repair with approved patching material) shall not exceed 10% of the total sheet surface area, unless otherwise directed by the engineer. Should this limit be exceeded the sheet shall be removed and replaced with an acceptable sheet. All patching material shall be fully cured prior to placing concrete. The patching material shall be compatible with the epoxy coating, inert in concrete, and suitable for repairs in the field. The patching material shall be prequalified, as required for the coating material and shall either be identified on the container as meeting the requirements of Annex A1 of ASTM D3963 - or shall be accompanied by a Materials Certificate certifying that the material meets or exceeds the requirements of said Annex A1.

Galvanized Reinforcement - All visible damage (i.e., scratches, nicks, cracks) to the galvanized coating of the reinforcement, caused during shipment, storage or placement shall be repaired by the Contractor at the job site in accordance with appropriate ASTM specifications. Ends of reinforcement that have been sheared, sawed, or cut by other means shall be coated. The area on the sheets and tie down bars damaged by welding shall be repaired and properly coated. Field coating of damaged areas shall be performed in accordance with the coating manufacturer's recommendations. Zinc coating shall conform to contract specifications and shall be applied to achieve a dry film equal to or exceeding that designated in the contract documents. All touchup paint shall be cured fully prior to placing concrete.

5-Splicing of Reinforcement:

- a. **General:** All reinforcement shall be furnished in the lengths indicated on the plans unless otherwise noted. Except for splices shown on the plans, splicing of sheets/mats will not be permitted without the approval of the engineer. A minimum of 50% of the wires shall be spliced at joints requiring load transfer.
- b. **Lapped:** Lapped splices shall be of the lengths required by code. In contact lap splices, the sheets shall be placed in contact and tied together in such a manner as to maintain the minimum distance to the surface of the concrete as shown on the plans. In non-contact lap splices, the sheets/mats shall be placed as shown on the plans. They shall be properly supported and tied to adjacent sheets/mats to develop the full strength of the section and to maintain distance from the surface of the concrete as shown on the plans.

- c. **Welded:** Welded splices shall be used at the locations shown on the plans and as directed by the engineer. Welding shall conform to AWS publication "Structural Welding Code, Reinforcing Steel, AWS D1.4" and applicable special provisions.

Welding splices shall not be used on epoxy-coated or galvanized sheets. No welding shall be performed near epoxy-coated or galvanized sheets/mats that will cause damage to the coating.

6-Substitutions: Substitutions of different sheet patterns, but equivalent sized sheets will be permitted when approved by the engineer. The substituted sheets shall have equivalent or larger reinforcement areas than needed for design or as shown on the plans.

7-Inspection: Reinforcement sheets/mats shall be placed, inspected, and approved by the engineer or inspector before placing of concrete begins. Concrete placed prior to approval of the reinforcement may be rejected and its removal required.

X.xx.04 METHOD OF MEASUREMENT:

1-GENERAL: No measurement for payment will be made for any clips, wire, separators, chairs, precast blocks and other material used for securing and supporting the reinforcement in the correct position.

2-REINFORCEMENT: Uncoated, epoxy coated, and galvanized reinforcement shall be classified as "Welded Wire Reinforcement", "Welded Wire Reinforcement-Epoxy Coated", and "Welded Wire Reinforcement-Galvanized" respectively.

This work shall be measured for payment by the number of pounds (kilograms) of reinforcement installed and accepted. The weight of reinforcement shall be computed using the values tabulated in accordance with the local building code or in ACI 318. No allowance shall be made for the epoxy or galvanized coatings. Tie down bars will not be measured for payment. No allowance will be made for additional lap splices not contemplated by the plans unless approved by the engineer. If substitutions are made upon the contractor's request and approved by the engineer, only the amount installed and approved will be included for payment.

3-SPLICED/LAPPED CONNECTIONS: Uncoated, epoxy coated, and galvanized bars or other methods used to secure sheets together shall be classified as splice systems and shall be in accordance with local code requirements.

The number of splice systems designated in the contract documents, installed, and accepted shall be measured for payment.

X.XX.05 BASIS OF PAYMENT: Payment for this work shall be made as follows:

1-REINFORCEMENT: This work shall be paid for at the contract unit price per pound (kilogram) for "Welded Wire Reinforcement", "Welded Wire Reinforcement-Epoxy Coated", and "Welded Wire Reinforcement-Galvanized" complete in place and accepted, including shop drawings, furnishing, fabricating, and placing reinforcement and all materials, equipment, tools, labor, and incidental work included.

2- SPLICED/LAPPED CONNECTIONS: This work shall be paid for at the contract unit price for each uncoated or coated splice system- complete in place and accepted, including shop drawings, furnishing, fabricating, and placing the splice systems and all materials, equipment, tools, labor, and work to be included.

<i>Pay Item</i>	<i>Pay Unit</i>
Welded Wire Reinforcement	lb. (kg)
Welded Wire Reinforcement-Epoxy Coated	lb. (kg)
Welded Wire Reinforcement-Galvanized	lb. (kg)
Splice System	each

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